

IN THE CLAIMS:

1. canceled
2. (currently amended) The method of claim ~~[[1]]~~ 34 wherein performing an HD plasma-based process includes connecting a top electrode to an inductively coupled HD plasma source.
3. (previously presented) The method of claim 2 wherein performing an HD plasma-based process includes
 - performing an HD plasma oxidation process;
 - in response to the HD oxidation process,
 - creating a reactive oxygen species;
 - breaking the Si-C bonds in the SiC substrate, to
 - form free Si and C atoms in the SiC substrate; and,
 - wherein forming a SiO₂ layer overlying the SiC substrateincludes bonding the free Si atoms in the SiC substrate to the HD plasma-generated reactive oxygen species, and growing the SiO₂ layer.
4. (original) The method of claim 3 wherein providing a SiC substrate includes maintaining the SiC substrate at a temperature of 360 degrees C, or less.
5. (currently amended) The method of claim 3 wherein supplying an atmosphere including less than 10% He and oxygen includes supplying O₂ ~~and He~~ with an inert gas, where the ratio of inert gas~~[[es]]~~ to O₂ is in the range between 10:1 and 200:1.

6. (currently amended) The method of claim 5 wherein supplying the O₂ and ~~He~~ with an inert gas includes using an inert gas selected from the group including Kr, He, and Ar.

7. (original) The method of claim 3 wherein performing an HD plasma-based process further includes bonding the free C atoms in the SiC substrate with the reactive oxygen species, forming carbon monoxide (CO); and
the method further comprising:
removing the CO from the process.

8. (currently amended) The method of claim 3 wherein supplying an atmosphere including less than 10% He and oxygen includes supplying a pressure of up to 500 milliTorr (mTorr), with a mixture of inert gases and oxygen in a ratio of approximately 10:1 to 200:1, and a total gas flow of approximately 50 to 200 standard cubic centimeters per minute (sccm); and,
wherein performing a HD plasma-based oxidation process includes:

locating the SiC substrate between a bottom electrode and the top electrode;

supplying a power density of up to 10 watts per square centimeter (W/cm²), at a frequency in the range of 13.56 to 300 megahertz (MHz), to the top electrode; and,

supplying a power density of up to 3 W/cm², at a frequency in the range of 50 kilohertz (KHz) to 13.56 MHz, to the bottom electrode.

9. (previously presented) The method of claim 3 wherein forming a SiO₂ layer overlying the SiC substrate includes forming a SiO₂ layer at deposition rate of about 100 Å, in 10 minutes.

10. (currently amended) The method of claim 2 wherein supplying an atmosphere including less than 10% He and oxygen includes additionally supplying SiH₄, N₂O, and N₂;

wherein performing an HD plasma-based process includes:

performing an HD plasma enhanced chemical vapor deposition (PECVD) process; and,

in response to the HD PECVD process, causing a reaction between the gases in the atmosphere; and,

wherein forming a SiO₂ layer overlying the SiC substrate includes depositing a SiO₂ layer over the SiC.

11. (original) The method of claim 10 providing a SiC substrate includes maintaining the SiC substrate at a temperature of 400 degrees C, or less.

12. (original) The method of claim 10 wherein supplying SiH₄, N₂O, and N₂ includes supplying SiH₄, N₂O, and N₂ in a ratio of 10-25:100:50.

13. (currently amended) The method of claim 10 wherein supplying an atmosphere including less than 10% oxygen

includes maintaining an atmosphere pressure in the range of 10 to 500 mTorr.

14. (currently amended) The method of claim 10 wherein supplying an atmosphere including less than 10% He and oxygen includes supplying a pressure of up to 500 mTorr, with a mixture of inert gases and oxygen in a ratio of approximately 10:1 to 200:1, and a total gas flow of approximately 50 to 200 sccm; and,

wherein performing a HD PECVD process includes:

locating the SiC substrate between a bottom electrode and the top electrode;

supplying a power density of up to 10 W/cm², at a frequency in the range of 13.56 to 300 MHz, to the top electrode; and,

supplying a power density of up to 3 W/cm², at a frequency in the range of 50 KHz to 13.56 MHz, to the bottom electrode.

15. (currently amended) The method of claim ~~[[1]]~~ 34 wherein forming a SiO₂ layer overlying the SiC substrate includes forming a SiO₂ layer having a bias temperature stress (BTS) of less than 1 volt, at 150 degrees C, with a bias voltage of +/- 2 megavolts per centimeter (MV/cm).

16. (currently amended) The method of claim ~~[[1]]~~ 34 wherein forming a SiO₂ layer overlying the SiC substrate includes

forming a SiO₂ layer having a breakdown strength of greater than 10 MV/cm.

17. (currently amended) The method of claim ~~[[1]]~~ 34 wherein forming a SiO₂ layer overlying the SiC substrate includes forming a SiO₂ layer having a leakage current density of less than 1×10^{-7} amps per square centimeter (A/cm²), at an applied field of 8 MV/cm.

18. (original) The method of claim 10 providing a SiC substrate includes maintaining the SiC substrate at a temperature of 150 degrees C, or less.

19. (original) The method of claim 2 further comprising:

prior to the HD plasma-based process, depositing a Si layer overlying the SiC substrate;

wherein performing an HD plasma-based process includes:

performing an HD oxidation process;

in response to the HD oxidation process,

creating a reactive oxygen species;

wherein forming a SiO₂ layer overlying the SiC substrate includes bonding Si atoms in the Si layer to the reactive oxygen species, growing a SiO₂ layer overlying the Si layer.

20. (original) The method of claim 19 wherein depositing a Si layer overlying the SiC substrate includes depositing a Si

layer selected from the group including amorphous Si, polycrystalline Si, and single-crystal Si.

21. (original) The method of claim 19 providing a SiC substrate includes maintaining the SiC substrate at a temperature of 400 degrees C, or less.

22. (currently amended) The method of claim 19 wherein supplying an atmosphere including less than 10% He and oxygen includes supplying a pressure of up to 500 mTorr, with a mixture of inert gas[[es]] and oxygen in a ratio of approximately 10:1 to 200:1, and a total gas flow of approximately 50 to 200 sccm; and,

wherein performing a HD oxidation process includes:

locating the SiC substrate between a bottom electrode and the top electrode;

supplying a power density of up to 10 W/cm², at a frequency in the range of 13.56 to 300 MHz, to the top electrode; and,

supplying a power density of up to 3 W/cm², at a frequency in the range of 50 KHz to 13.56 MHz, to the bottom electrode.

23. (currently amended) The method of claim 22 wherein supplying a pressure of up to 500 mTorr, with a mixture of inert gases and oxygen in a ratio of approximately 10:1 to 200:1, includes mixing oxygen and ~~He~~ with an inert gas selected from the group including helium, argon, and krypton.

24. (currently amended) The method of claim 2 further comprising:

- depositing a Si layer;
- wherein performing an HD plasma-based process includes:
 - initially performing an HD oxidation process;
 - in response to the HD oxidation process,
- creating a reactive oxygen species;
- wherein performing an HD plasma-based process includes:
 - subsequently performing a HD PECVD process;
 - in response to the HD PECVD process, causing
- a reaction between gases in the atmosphere;
- wherein supplying an atmosphere including less than 10% ~~He and~~ oxygen includes, with respect to the PECVD process, supplying SiH₄, N₂O, and N₂;
- wherein forming a SiO₂ layer overlying the SiC substrate includes a combination of growing and depositing a SiO₂ layer over the Si layer.

25. (previously presented) The method of claim 19 wherein depositing a Si layer overlying the SiC substrate includes depositing a Si layer selected from the group including amorphous Si, polycrystalline Si, and single-crystal Si.

26. (original) The method of claim 24 providing a SiC substrate includes maintaining the SiC substrate at a temperature of 400 degrees C, or less.

27. (currently amended) The method of claim 24 wherein supplying an atmosphere including less than 10% He and oxygen includes supplying a pressure of up to 500 mTorr, with a mixture of inert gas[[es]] and oxygen in a ratio of approximately 10:1 to 200:1, and a total gas flow of approximately 50 to 200 sccm; and,

wherein performing a HD oxidation process includes:

locating the SiC substrate between a bottom electrode and the top electrode;

supplying a power density of up to 10 W/cm², at a frequency in the range of 13.56 to 300 MHz, to the top electrode; and,

supplying a power density of up to 3 W/cm², at a frequency in the range of 50 KHz to 13.56 MHz, to the bottom electrode.

28. (currently amended) The method of claim 27 wherein supplying a pressure of up to 500 mTorr, with a mixture of inert gases and oxygen in a ratio of approximately 10:1 to 200:1, includes mixing oxygen ~~and He~~ with an inert gas selected from the group including helium, argon, and krypton.

29. (original) The method of claim 24 wherein supplying SiH₄, N₂O, and N₂ in the HD PECVD process includes supplying SiH₄, N₂O, and N₂ in a ratio of 10-25:100:50.

30. (currently amended) The method of claim 29 wherein supplying an atmosphere including less than 10% He and oxygen includes supplying a pressure of up to 500 mTorr, with a mixture of inert gas[[es]] and oxygen in a ratio of approximately 10:1 to 200:1, and a total gas flow of approximately 50 to 200 sccm; and,

wherein performing a HD PECVD process includes:

locating the SiC substrate between a bottom electrode and the top electrode;

supplying a power density of up to 10 W/cm², at a frequency in the range of 13.56 to 300 MHz, to the top electrode; and,

supplying a power density of up to 3 W/cm², at a frequency in the range of 50 KHz to 13.56 MHz, to the bottom electrode.

31. (original) The method of claim 2 wherein performing an HD plasma-based process includes:

performing an HD oxidation process;

in response to the HD oxidation process,

creating a reactive oxygen species;

wherein forming a SiO₂ layer overlying the SiC substrate includes bonding the free Si atoms in the SiC substrate to the HD plasma-generated reactive oxygen species, and growing the SiO₂ layer;

the method further comprising:

etching the SiO₂ layer, exposing a region of the SiC substrate; and,

depositing a metal in the exposed region of SiC substrate to form a metal-semiconductor contact.

32-33. canceled

34. (previously presented) A method for forming silicon dioxide (SiO₂) on a silicon carbide (SiC) substrate, the method comprising:
providing a SiC substrate;
supplying an atmosphere including less than 10% oxygen;
performing a high-density (HD) plasma-based process; and,
forming a silicon dioxide (SiO₂) layer overlying the SiC substrate.

35-38. canceled